AMENDMENT TO THE CLAIMS

Pursuant to 37 C.F.R. § 1.121, the following claims replace all prior versions and listings of claims in the Application.

LISTING OF CLAIMS

1. (Currently Amended) A program storage device readable by a machine, the device tangibly embodying a program of instructions executable by the machine to perform method steps of imaging a three-dimensional (3D) volume, the method steps comprising:

creating one or more three-dimensional (3D) sampling probe(s), wherein each 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of the 3D sampling probe(s) the image comprising an intersection of the 3D sampling probe(s) and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) moves through the 3D volume, the image of the 3D sampling probe(s) is redrawn substantially at the same time as the 3D sampling probe is moved.

2. (Previously Presented) The program storage device of claim 1, wherein the method steps further comprises:

repeating the drawing step to reshape the 3D sampling probe(s) so that as the 3D sampling probe(s) is changed in shape, the image of the 3D sampling probe(s) is redrawn substantially at the same time;

3. (Previously Presented) The program storage device of claim 1, wherein the image of the 3D sampling probe(s) is redrawn at a frame rate of at least about 10 to 15 frames per second.

4. (Previously Presented) The program storage device of claim 1, wherein the drawing step comprises:

extracting from the 3D volume a sub-volume data set corresponding to the surfaces of the 3D sampling probe(s); and

texture mapping the sub-volume data set onto the surfaces of the 3D sampling probe(s).

5. (Previously Presented) The program storage device of claim 1, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D volume and the 3D sampling probe(s) so that as the 3D orientation is changed, the image of the 3D sampling probe(s) is redrawn substantially at the same time.

6. (Previously Presented) The program storage device of claim 1, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D sampling probe(s) independently of a 3D orientation of the 3D volume so that as the 3D orientation of the 3D sampling probe(s) is changed, the image of the 3D sampling probe(s) is redrawn substantially at the same time.

7. (Previously Presented) The program storage device of claim 2, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D volume and the 3D sampling probe(s) so that as the 3D orientation is changed, the image of the 3D sampling probe(s) is redrawn substantially at the same time.

8. (Previously Presented) The program storage device of claim 2, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D sampling probe(s) independently of a 3D orientation of the 3D volume so that as the 3D orientation of the 3D sampling probe(s) is changed, the image of the 3D sampling probe(s) is redrawn substantially at the same time.

9. (Previously Presented) The program storage device of claim 1, wherein the drawing step comprises:

drawing an image of an intersection of one of the 3D sampling probes with another one of the 3D sampling probes.

10. (Previously Presented) The program storage device of claim 9, wherein the one of the 3D sampling probe(s) is a data probe and the another one of the 3D sampling probe(s) is a substantially transparent cut probe that cuts out a 3D sub-section of the data probe so that the image of the intersection of the data probate and the cut probe comprises an intersecting surface internal to the data probe.

11. (Previously Presented) The program storage device of claim 10, wherein the drawing step comprises:

drawing an image of a third 3D sampling probe, wherein the third 3D sampling probe is volume rendered at least partially within the 3D sub-section of the data probe.

12. (Previously Presented) The program storage device of claim 1, wherein the drawing step comprises:

dividing the image of the 3D sampling probe(s) into a plurality of over-lapping sub-images; and

simultaneously drawing the plurality of over-lapping sub-images, thereby increasing a field-of-view to the user.

13. (Previously Presented) The program storage device of claim 1, wherein the 3D volume is defined by a data set of voxels, each voxel expressed in the form of x, y, z, data value.

14. (Previously Presented) The program storage device of claim 13, wherein the data value comprises data selected from the group comprising seismic data, remove sensing data, well log data, gravity and magnetic field data, sidescan sonar image data, temperature, pressure, saturation, reflectivity, acoustical impedance and velocity.

15. (Previously Presented) The program storage device of claim 13, wherein the drawing step comprises:

extracting from the 3D volume a sub-volume data set corresponding to the 3D sampling probe(s); and

volume rendering the sub-volume data set in accordance with a transparency setting that is a function of each data value, thereby volume imaging the 3D sampling probe(s).

16. (Previously Presented) The program storage device of claim 13, wherein the method steps further comprise:

identifying a seed point, wherein the seed point is a voxel within the data set of voxels that defines one of the 3D sampling probe(s); and

defining a selection criteria based on the data values, the drawing step being carried out to image selected points only within the 3D sampling probe, wherein the selected points are connected to the seed point, and the data values of the selected points satisfy the selection criteria.

17. (Previously Presented) The program storage device of claim 16, wherein the 3D sampling probe containing the seed point is an auto picking 3D sampling probe, wherein the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn within at least one of the auto picking 3D sampling probe and the 3D volume substantially at the same time.

18. (Previously Presented) The program storage device of claim 17, wherein the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn only within the auto picking 3D sapling probate substantially at the same time.

19. (Previously Presented) The program device of claim 17, wherein the method steps further comprise:

defining an eraser 3D sampling probe; and

defining a de-selection criteria based on data values, wherein the repeating step is carried out so that as the eraser 3D sampling probe moves through the selected points that satisfy the de-selection criteria, the selected points that satisfy the de-selection criteria are deleted from the image substantially at the same time.

20. (Previously Presented) The program storage device of claim 1, wherein the image of the 3D sampling probe(s) is redrawn substantially at the same time as the 3D

sampling probe(s) moves through the 3D volume so that a user-selected feature defined by the data values is at least partially visualized.

21. (Currently Amended) A program storage device readable by a machine, the device tangibly embodying a program of instructions executable by the machine to perform method steps of imaging a three-dimensional (3D) volume, the method steps comprising:

creating a three-dimensional (3D) sampling probe, wherein the 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of at least one of the 3D sampling probe and the 3D volume, the image comprising an intersection of the 3D sampling probe and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe within the 3D volume so that as the 3D sampling probe moves through the 3D volume, the image of the 3D sampling probe is redrawn substantially at the same time as the 3D sampling probe is moved.

22. (Previously Presented) The program storage device of Claim 21, wherein the 3D sampling probe is a data probe and the 3D volume is substantially transparent.

23. (Previously Presented) The program storage device of Claim 21, wherein the 3D sampling probe is a substantially transparent cut probe and the 3D volume comprises a visible data set of voxels, each voxel expressed in the form of x, y, z, data value.

24. (Currently Amended) A method for imaging a three-dimensional (3D) data volume, the method comprising the steps of:

creating a three-dimensional (3D) sampling probe wherein the 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of at least one of the 3D sampling probe and the 3D volume, the image comprising an intersection of the 3D sampling probe and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe within the 3D volume so that as the 3D sampling probe moves through the 3D volume, the image of the 3D sampling probe is redrawn substantially at the same time as the 3D sampling probe is moved.

25. (Previously Presented) The method of claim 24, wherein the 3D sampling probe is a data probe and the 3D volume is substantially transparent.

26. (Previously Presented) The method of claim 24, wherein the 3D sampling probe is a substantially transparent cut probe and the 3D volume comprises a visible data set of voxels, each voxel expressed in the form of x, y, z, data value.

27. (Currently Amended) A program storage device readable by a machine, the device tangibly embodying a program of instructions executable by the machine to perform method steps of imaging a three-dimensional (3D) volume, the method steps comprising:

creating one or more three-dimensional (3D) sampling probe(s), wherein each 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of the 3D sampling probe(s), the image comprising an intersection of the 3D sampling probe(s) and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) moves through the 3D volume, the image of the 3D sampling probe(s) is redrawn sufficiently fast to be perceived in real time as the 3D sampling probe is moved.

28. (Previously Presented) The program storage device of claim 27, wherein the method steps further comprise:

repeating the drawing step to reshape the 3D sampling probe(s) so that as the 3D sampling probe(s) is changed in shape, the image of the 3D sampling probe(s) is redrawn in real time.

29. (Previously Presented) The program storage device of claim 27, wherein the image of the 3D sampling probe(s) is redrawn at a frame rate of at least about 10 to 15 frames per second.

30. (Previously Presented) The program storage device of claim 27, wherein the drawing step comprises:

extracting from the 3D volume a sub-volume data set corresponding to the surfaces of the 3D sampling probe(s); and

texture mapping the sub-volume data set onto the surfaces of the 3D sampling probe(s).

31. (Previously Presented) The program storage device of claim 27, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D volume and the 3D sampling probe(s) so that as the 3D orientation is changed, the image of the 3D sampling probe(s) is redrawn in real time.

32. (Previously Presented) The program storage device of claim 27, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D sampling probe(s) independently of a 3D orientation of the 3D volume so that as the 3D orientation of the 3D sampling probe(s) is changed, the image of the 3D sampling probe(s) is redrawn in real time.

33. (Previously Presented) The program storage device of claim 28, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D volume and the 3D sampling probe(s) so that as the 3D orientation is changed, the image of the 3D sampling probe(s) is redrawn in real time.

34. (Previously Presented) The program storage device of claim 28, wherein the method steps further comprise:

repeating the drawing step to rotate a 3D orientation of the 3D sampling probe(s) independently of a 3D orientation of the 3D volume so that as the 3D orientation of the 3D sampling probe(s) is changed, the image of the 3D sampling probe(s) is redrawn in real time.

35. (Previously Presented) The program storage device of claim 27, wherein the drawing step comprises:

drawing an image of an intersection of one of the 3D sampling probates with another one of the 3D sampling probes.

36. (Previously Presented) The program storage device of claim 35, wherein the one of the 3D sampling probe(s) is a data probe and the another one of the 3D sampling probe(s) is a substantially transparent cut probe that cuts out a 3D sub-section of the data probe so that the image of the intersection of the data probe and the cut probe comprises an intersecting surface internal to the data probe.

37. (Previously Presented) The program storage device of claim 36, wherein the drawing step comprises:

drawing an image of a third 3D sampling probe, wherein the third 3D sampling probe is volume rendered at least partially within the 3D sub-section of the data probe.

38. (Previously Presented) The program storage device of claim 27, wherein the drawing step comprises:

dividing the image of the 3D sampling probe(s) into a plurality of over-lapping sub-images; and

simultaneously drawing the plurality of over-lapping sub-images, thereby increasing a field-of-view to the user.

39. (Previously Presented) The program storage device of claim 27, wherein the 3D volume is defined by a data set of voxels, each voxel expressed in the form of x, y, z, data value.

40. (Previously Presented) The program storage device of claim 39, wherein the data value comprises data selected from the group comprising seismic data, remote sensing data, well log data, gravity and magnetic field data, sidescan sonar image data, temperature, pressure, saturation, reflectivity, acoustical impedance and velocity.

41. (Previously Presented) The program storage device of claim 39, wherein the drawing step comprises:

extracting from the 3D volume a sub-volume data set corresponding to the 3D sampling probe(s); and

volume rendering the sub-volume data set in accordance with a transparency setting that is a function of each data value, thereby volume imaging the 3D sampling probe(s).

42. (Previously Presented) The program storage device of claim 39, wherein the method steps further comprise:

identifying a seed point, wherein the seed point is a voxel within the data set of voxels that defines one of the 3D sampling probe(s); and

defining a selection criteria based on the data values, the drawing step being carried out to image selected points only within the 3D sampling probe, wherein the selected points are connected to the seed point, and the data values of the selected points satisfy the selection criteria.

43. (Previously Presented) The program storage device of claim 42, wherein the 3D sampling probe containing the seed point is an auto picking 3D sampling probe, wherein the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn within at least one of the auto picking 3D sampling probe and the 3D volume in real time.

44. (Previously Presented) The program storage device of claim 43, wherein the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn only with in the auto picking 3D sampling probe in real time.

45. (Previously Presented) The program storage device of claim 43, wherein the method steps further comprise:

defining an eraser 3D sampling probe; and

defining a de-selection criteria based on data values, wherein the repeating step is carried out so that as the eraser 3D sampling probe moves through the selected points that satisfy the de-selection criteria, the selected points that satisfy the de-selection criteria are deleted from the image in real time.

46. (Previously Presented) The program storage device of claim 27, wherein the image of the 3D sampling probe(s) is redrawn in real time as the 3D sampling probe(s) moves through the 3D volume so that a user-selected feature defined by the data values is at least partially visualized.

47. (Currently Amended) A program storage device readable by a machine, the device tangibly embodying a program of instructions executable by the machine to perform method steps of imaging a three-dimensional (3D) volume, the method steps comprising.

creating a three-dimensional (3D) sampling probe, wherein the 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of at least one of the 3D sampling probe and the 3D volume, the image comprising an intersection of the 3D sampling probe and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe within the 3D volume so that as the 3D sampling probe moves through the 3D volume, the image of the 3D sampling probe is redrawn sufficiently fast to be perceived in real time as the 3D sampling probe is moved.

48. (Previously Presented) The program storage device of Claim 47, wherein the 3D sampling probe is a data probe and the 3D volume is substantially transparent.

49. (Previously Presented) The program storage device of Claim 47, wherein the 3D sampling probe is a substantially transparent cut probe and the 3D volume comprises a visible data set of voxels, each voxel expressed in the form of x, y, z, data value.

50. (Currently Amended) A method for imaging a three-dimensional (3D) data volume, the method comprising the steps of:

creating a three-dimensional (3D) sampling probe wherein the 3D sampling probe is a sub-volume of the 3D volume;

drawing an image of at least one of the 3D sampling probe and the 3D volume, the image comprising an intersection of the 3D sampling probe and the 3D volume; and

repeating the drawing step responsive to movement of the 3D sampling probe within the 3D volume so that as the 3D sampling probe moves through the 3D volume, the image of the 3D sampling probe is redrawn sufficiently fast to be perceived in real time as the 3D sampling probe is moved.

51. (Previously Presented) The method of claim 47, wherein the 3D sampling probe is a data probe and the 3D volume is substantially transparent.

52. (Previously Presented) The method of claim 47, wherein the 3D sampling probe is a substantially transparent cut probe and the 3D volume comprises a visible data set of voxels, each voxel expressed in the form of x, y, z, data value.